Page 1, between the Title and the paragraph beginning at line 5, insert the following heading and subheading:

--BACKGROUND OF THE INVENTION

a1 1. Field of the Invention--;

Page 1, above the paragraph beginning at line 8, insert the following subheading:

--2. Discussion of Prior Art--.

a2

Page 3, above the paragraph beginning at line 13, insert the following heading:

--SUMMARY OF THE INVENTION--.

a3

Page 5, above the paragraph beginning at line 24, insert the following heading:

--BRIEF DESCRIPTION OF THE DRAWINGS--.

a4

Page 7, above the paragraph beginning at line 4, insert the following heading:

--DETAILED DISCUSSION OF EMBODIMENTS--.

a5

IN THE CLAIMS

Please amend claims 1-7 and 9-19 as follows.

Please substitute the following amended claim(s) for corresponding claim(s) previously presented. A copy of the amended claim(s) showing current revisions is attached.

a6 1. (*Amended)* An impact ionisation avalanche transit time (IMPATT) diode device comprising:

a main avalanche region;

a drift region; and

a narrow bandgap region with a bandgap narrower than the bandgap in the main avalanche region which narrow bandgap region (4, 40) is located adjacent to the main avalanche region in order to generate within the narrow bandgap region a tunnel current which is injected into the main avalanche region.

2. (*Amended)* An IMPATT diode according to claim 1 wherein the narrow bandgap region is arranged to generate a tunnel current for injection into the main avalanche region at the peak reverse bias voltage applied to the diode.

(continued)

3. (*Amended)* An IMPATT diode according to claim 1 wherein the narrow bandgap region is located at the edge of the main avalanche region.

4. (*Amended)* An IMPATT diode according to claim 1, wherein the narrow bandgap region is located between a heavily doped contact region and the main avalanche region.

5. (*Amended)* An IMPATT diode according to claim 1, wherein the narrow bandgap region comprises one layer of narrow bandgap material.

6. (*Amended)* An IMPATT diode according to claim 1, wherein the narrow bandgap region comprises a plurality of layers of narrow bandgap material.

A6 (concluded)

7. (*Amended)* An IMPATT diode according to claim 1, wherein the diode has a lo-hi-lo doping profile.

9. (*Amended)* An IMPATT diode according to claim 1, wherein the diode is a double drift diode.

10. (*Amended)* An IMPATT diode according to claim 1, wherein the diode is made of III-V semiconductor materials.

A7

11. (*Amended)* An IMPATT diode according to claim 1, wherein the diode is made of group IV semiconductor materials.

12. (*Amended)* An IMPATT diode according to claim 11 wherein the narrow bandgap region is made of at least one layer of Silicon Germanium and the main avalanche region is made of Silicon.

13. (*Amended)* An IMPATT diode according to claim 10 wherein the narrow bandgap region is made of at least one layer of Gallium Arsenide and the main avalanche region is made of Aluminium Gallium Arsenide.

14. (*Amended)* An IMPATT diode according to claim 1, wherein the length of the drift region or regions is between 2 and 6 times the length of the avalanche region.

15. *(Amended)* An IMPATT diode according to claim 14 wherein the length of the drift region or regions is between 3.5 and 4.5 times the length of the avalanche region.

16. *(Amended)* An IMPATT diode according to claim 1, arranged such that at least part of the tunnel current can be generated by optical excitation.

17. *(Amended)* A method of operating the IMPATT diode of claim 1, wherein an oscillating voltage across the diode has a period of between 4 and 12 times the transit time of the avalanche region.

18. *(Amended)* A method according to claim 17 wherein the oscillating voltage has a period of between 7.5 and 8.5 times the transit time of the avalanche region.

19. *(Amended)* A method according to claim 17 including the step of optically exiting at least part of the tunnel current.